American River Basin: Upper Unionhouse Creek Flood Protection Project

Attachment 9: Water Quality and Other Benefits

Contents

The Upper Unionhouse Creek Flood Protection Project provides a broad array of benefits within the American River Basin (ARB) Region and externally to the Sacramento-San Joaquin Delta (Delta). While some of these benefits may be quantifiable via economic analyses, many benefits provided by the project cannot be quantified due to their complex nature. This attachment provides economic analyses of water quality and other benefits expected as a result of implementation of the Upper Unionhouse Creek Flood Protection Project.

Summary

Unionhouse Creek is a tributary to Morrison Creek in the southern part of the City of Sacramento (City) and in unincorporated Sacramento County (County). The two creeks converge just to the west of the Union Pacific Railroad (UPRR) line about one-half mile north of the Sacramento Regional Waste Water Treatment Plant (Treatment Plant). East of Franklin Boulevard, the creek is confined to an excavated channel. Hydraulic modeling studies indicate that the portion of the channel between Franklin Boulevard and Center Parkway floods out of bank in 100-year and more frequent storms. The modeled flows exiting the channel inundate low lying urban neighborhoods on both sides of the creek. The modeling studies indicate that approximately 250 to 300 homes in the inundation area will suffer damage in the event of a 100-year flood.

The Sacramento Area Flood Control Agency (SAFCA) proposes to address the existing flood risk along Unionhouse Creek by expanding the width and adjusting the depth of the existing channel between Franklin Boulevard and Bruceville Road. Between Strawberry Creek immediately downstream of Bruceville Road and Center Parkway, the existing 2,800-foot trapezoidal channel would be widened to the south by up to 17 feet to a width of 75 feet with a new 2H:1V side slope and a widened channel bottom of up to 26.25 feet. The existing concrete channel bottom in this reach of the creek would be left

in place for continued maintenance of the channel, and a concrete curb would be added between the concrete bottom and the earthen bottom. Between Center Parkway and Franklin Boulevard, the existing 5,400 foot trapezoidal channel would be widened to the south by up to 17 feet to a width of 75 feet with a new 2H:1V:side slope. The existing concrete channel bottom would be demolished and removed, the channel would be slightly deepened and a new concrete bottom would be installed across the width of the widened channel, which could be up to 24.5 feet.

This project would significantly reduce the likelihood of overbank flooding in this portion of the creek and would provide at least a 100-year level of flood protection to the lands adjacent to the creek in this area, thus removing the 250 to 300 homes from the regulated floodplain and protecting the homeowners from future potential flood damage. The project will also allow for the expansion of Sacramento Regional Transit District's light rail service area, currently stalled due to flooding threats, thereby reducing future greenhouse gas emissions and reducing total energy usage in the area. Additionally, the project may improve water quality in Unionhouse Creek by reducing the velocity of water thus increasing sedimentation.

Summary of Costs and Benefits

As documented in Attachment 4, the budgetary estimate for the Project is $1,953,546. The total present value of the project is $1,934,031 and is based on a 50-year project life cycle, which is consistent with the life cycle assumed in the flood damage reduction benefit analysis. The annual maintenance costs for the project are estimated to be $20,000 and includes erosion repair, a two-man crew mowing the banks of the creek twice a year, cleaning the bottom of the channel and other site-specific maintenance. There are no administration, operation or replacements costs assumed for this project as the project is a passive project.

A summary of the benefits and costs for the project is provided in Table 1. Total present value costs for this project are $1,934,031 and are illustrated in Table 2.

Table 1: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$1,934,031
Qualitative Benefit or Cost	Qualitative indicator*
Flood Control Benefits	
Flood Damage Reduction to adjacent watershed	++
Water Supply Benefits	
Incidental recharge of underlying groundwater basin over earthen channel areas and/or cracks in channel lining	+
Water Quality Benefits	
Reduction in pollutant loading to downstream reaches	+
Other Benefits	
Facilitation of light-rail extension project	++

O&M = Operations and Maintenance

* Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

Table 2: Annual Cost of Project

Project: Upper Unionhouse Creek Flood Protection Project									
	Initial Costs	Operations and Maintenance Costs (1)						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total cost From Table 7 (row (i), column (d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (f)	Discount Factor	Discounted Costs (g) x (h)
2009	$0.00						$0.00	1.000	$0
2010	$0.00						$0.00	0.943	$0
2011	$566,479.00						$566,479.00	0.890	$504,166
2012	$1,387,067.00						$1,387,067.00	0.840	$1,165,136
2013				$20,000			$20,000.00	0.792	$15,840
2014				$20,000			$20,000.00	0.747	$14,940
2015				$20,000			$20,000.00	0.705	$14,100
2016				$20,000			$20,000.00	0.665	$13,300
2017				$20,000			$20,000.00	0.627	$12,540
2018				$20,000			$20,000.00	0.592	$11,840
2019				$20,000			$20,000.00	0.558	$11,160
2020				$20,000			$20,000.00	0.527	$10,540
2021				$20,000			$20,000.00	0.497	$9,940
2022				$20,000			$20,000.00	0.469	$9,380
2023				$20,000			$20,000.00	0.442	$8,840
2024				$20,000			$20,000.00	0.417	$8,340
2025				$20,000			$20,000.00	0.394	$7,880
2026				$20,000			$20,000.00	0.371	$7,420
2027				$20,000			$20,000.00	0.350	$7,000
2028				$20,000			$20,000.00	0.331	$6,620
2029				$20,000			$20,000.00	0.312	$6,240
2030				$20,000			$20,000.00	0.294	$5,880
2031				$20,000			$20,000.00	0.278	$5,560
2032				$20,000			$20,000.00	0.262	$5,240
2033				$20,000			$20,000.00	0.247	$4,940
2034				$20,000			$20,000.00	0.233	$4,660

	Initial Costs	Operations and Maintenance Costs (1)						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total cost From Table 7 (row (i), column (d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +…+ (f)	Discount Factor	Discounted Costs (g) x (h)
2035				$20,000			$20,000.00	0.220	$4,400
2036				$20,000			$20,000.00	0.207	$4,140
2037				$20,000			$20,000.00	0.196	$3,920
2038				$20,000			$20,000.00	0.185	$3,700
2039				$20,000			$20,000.00	0.174	$3,480
2040				$20,000			$20,000.00	0.164	$3,280
2041				$20,000			$20,000.00	0.155	$3,100
2042				$20,000			$20,000.00	0.146	$2,920
2043				$20,000			$20,000.00	0.138	$2,760
2044				$20,000			$20,000.00	0.130	$2,600
2045				$20,000			$20,000.00	0.123	$2,460
2046				$20,000			$20,000.00	0.116	$2,320
2047				$20,000			$20,000.00	0.109	$2,180
2048				$20,000			$20,000.00	0.103	$2,060
2049				$20,000			$20,000.00	0.097	$1,940
2050				$20,000			$20,000.00	0.092	$1,840
2051				$20,000			$20,000.00	0.087	$1,740
2052				$20,000			$20,000.00	0.082	$1,640
2053				$20,000			$20,000.00	0.077	$1,540
2054				$20,000			$20,000.00	0.073	$1,460
2055				$20,000			$20,000.00	0.069	$1,380
2056				$20,000			$20,000.00	0.065	$1,300
2057				$20,000			$20,000.00	0.061	$1,220
2058				$20,000			$20,000.00	0.058	$1,160
2059				$20,000			$20,000.00	0.054	$1,086
2060				$20,000			$20,000.00	0.051	$1,024
2061				$20,000			$20,000.00	0.048	$966
2062				$20,000			$20,000.00	0.046	$912
Total Present Value of Discounted Costs (Sum of Column (i))									$1,934,031

Comments:
Maintenance is expected to be about $20,000/year based on crew rates for vegetation bank management, channel maintenance (bottom scraping), erosion repair and other site-specific maintenance. There are no replacement, operations or administration costs associated with the project. The project life is expected to be 50 years.

The "Without Project" Baseline

Unionhouse Creek is a tributary to Morrison Creek in the southern part of the City of Sacramento (City) and in unincorporated Sacramento County (County). East of Franklin Boulevard, the creek is confined to an excavated channel. Hydraulic modeling studies indicate that the portion of the channel between Franklin Boulevard and Center Parkway floods out of bank in 100-year and more frequent storms. The modeled flows exiting the channel inundate low lying urban neighborhoods on both sides of the creek, endangering approximately 250 to 300 homes in the inundation area. Without the proposed project, this potential for flood inundation will continue to exist and threaten these homes.

In addition to the homes, flooding from Upper Unionhouse Creek threatens ongoing regional transportation planning efforts in the publically owned corridor adjacent to Unionhouse Creek between Franklin Boulevard and Bruceville Road. This corridor currently contains Cosumnes River Boulevard, a two lane road that extends eastward from Franklin Boulevard to Highway 99. The City has plans to expand this roadway into a four-lane expressway that connects Highway 99 and Interstate 5 near the town of Freeport. In addition, the Sacramento Regional Transit Authority (RT) has received Federal approval to extend light rail service though this corridor along the northern edge of the expanded roadway. Neither project can proceed until the flood control issues associated with Unionhouse Creek are resolved.

Water Quality and Other Benefits

Although no water quality or other non-supply or flood damage reduction benefits have been monetized, two significant benefits have been identified. These include allowing for the expansion of Sacramento Regional Transit District's light rail service area by removing the concerns of flooding and allowing for the transit project to be constructed, and potentially improving the water quality in Unionhouse Creek.

Facilitation of Light-Rail Extension Project

The authorized scope of the federally-authorized South Sacramento Streams Group (SSSG) Project (Federal Project) includes the Unionhouse Creek channel between Franklin Boulevard and Center Parkway. However, as previously noted, the U. S. Army Corps of Engineers (Corps) has suspended design and construction efforts east of Franklin Boulevard pending completion of a Limited Re-evaluation Report to update the hydrology of the watershed and confirm the costs and benefits of extending the Federal Project improvements to this portion of the creek. The uncertainty created by this pause in the Federal Project has complicated ongoing regional transportation planning efforts in the publically owned corridor adjacent to Unionhouse Creek between Franklin Boulevard and Bruceville Road. This corridor currently contains Cosumnes River Boulevard, a two lane road that extends eastward from Franklin Boulevard to Highway 99. The City has plans to expand this roadway into a four-lane expressway that connects Highway 99 and Interstate 5 near the town of Freeport. In addition, the Sacramento Regional Transit Authority (RT) has received Federal approval to extend light rail service though this corridor along the northern edge of the expanded roadway. Neither project can proceed until the flood control issues associated with Unionhouse Creek are resolved.

The Upper Unionhouse Creek Flood Protection Project will address the existing flood risk along Unionhouse Creek by expanding the width and adjusting the depth of the existing channel between

Franklin Boulevard and Bruceville Road. This project would significantly reduce the likelihood of overbank flooding in this portion of the creek and would provide at least a 100-year level of flood protection to the lands adjacent to the creek in this area, thus facilitating the construction of the planned road addition and approved light-rail service extension.

This regional transit project is critical to the south Sacramento area, both from the standpoint of improving accessibility to public transportation for all (including local minority and low-income populations) and from the air pollution reduction benefits afforded by the project. As described in the *South Sacramento Corridor Phase 2 Supplemental Draft Environmental Impact Statement/Subsequent Draft Environmental Impact Report* (Sacramento Regional Transit District, 2008), the transportation project will reduce criteria pollutants and precursor emissions, as well as greenhouse gas emissions. In fact, the transit project will provide the following reduction in air pollution:

Table 3: Reduction in Air Pollution by Regional Transit Project

Pollutant	Tons per Year Reduction
CO	- 6.09
NO_x	-2.38
VOC	-3.20
PM_{10}	-0.15
Greenhouse Gases (CO_2)	-772.63

Additionally, implementation of the regional transit project will reduce direct energy consumption by 37,009 BTUs per year.

Improves Water Quality in Unionhouse Creek

While the proposed Upper Unionhouse Creek Flood Protection Project is designed to reduce flood damage impacts, the widening of Upper Unionhouse Creek, constructed as part of the project, will result in slower flow velocities in that reach. The slower velocities will allow for the settling of entrained sediments and other pollutants and thus may improve the water quality in the Unionhouse Creek and downstream reaches of Morrison Creek.

Distribution of Project Benefits

Beneficiaries of this project include the population living and working in the southern Sacramento area and water suppliers who utilize the Central Basin groundwater aquifers as a water source.

Table 4: Project Beneficiaries Summary

Local	Regional
Population in southern Sacramento	Water Suppliers using the Central Basin groundwater aquifers

Project Benefits Timeline Description

The project's water quality benefits and other benefits will improve immediately following completion of channel modifications (scheduled to occur in 2012). The flood reduction benefits will be realized immediately following construction (allowing the regional transit projects to proceed) and through the slowing of channel flows resulting from increases in channel cross-sectional area.

Potential Adverse Effects from the Project

There are no potential adverse effects to water quality or other adjacent land uses associated with the project.

Summary of Findings, Tables

The Upper Unionhouse Flood Protection Project does convey incidental water supply benefits along with flood damage reduction benefits (which are the primary motivation for the project) and other benefits. The project will reduce the frequency of flooding in the Upper Unionhouse Creek area, and by the nature of the project, will promote the incidental recharge of the underlying groundwater basin. These water supply benefits are summarized in Table 5.

Table 5: Qualitative Benefits Summary – Water Quality and Other Benefits

Benefit	Qualitative Indicator
Facilitates construction of regional transit projects necessary to mitigate traffic, reduce air pollutant and greenhouse gas emissions, improve access to public transportation for all (including minority and low-income residents)	++
Improves downstream water quality	+

Omissions, Biases and Uncertainties

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, the main uncertainties are associated with the extent to which this project contributes to the reduction of pollutant loading in Unionhouse Creek waters. These issues are listed in Table 6.

Table 6: Omissions, Biases, and Uncertainties, and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Benefit of reduced pollutant loading in creek flows	U	The reduction in pollutant loading resulting from lowering of Unionhouse Creek waters is not known, and will be dependent on the size, duration and frequency of storm events and the quantity of pollutants in creek waters during any particular storm event.

*Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
- = Likely to decrease benefits.
-- = Likely to decrease net benefits significantly.
U = Uncertain, could be + or -.